B2.53-R3: COMPUTER GRAPHICS

NOTE:

1.	There are **TWO PARTS** in this Module/Paper. **PART ONE** contains **FOUR** questions and **PART TWO** contains **FIVE** questions.
2.	**PART ONE** is to be answered in the **TEAR-OFF ANSWER SHEET** only, attached to the question paper, as per the instructions contained therein. **PART ONE** is **NOT** to be answered in the answer book.
3.	Maximum time allotted for **PART ONE** is **ONE HOUR**. Answer book for **PART TWO** will be supplied at the table when the answer sheet for **PART ONE** is returned. However, candidates, who complete **PART ONE** earlier than one hour, can collect the answer book for **PART TWO** immediately after handing over the answer sheet for **PART ONE**.

TOTAL TIME: 3 HOURS   **TOTAL MARKS: 100**
                                            (PART ONE – 40; PART TWO – 60)

PART ONE
(Answer all the questions)

1.   **Each question below gives a multiple choice of answers. Choose the most appropriate one and enter in the "tear-off" answer sheet attached to the question paper, following instructions therein.** (1 x 10)

1.1   In Bresenham's circle algorithm, we do not require
A)   floating-point arithmetic
B)   calculation along the line to a pixel centre
C)   multiplication or division
D)   all of the above

1.2   The standard adopted by DVD and DTV is
A)   JPEG
B)   JPEG-2000
C)   MPEG-1
D)   MPEG-2

1.3   In the Cohen-Sutherland line clipping algorithm, "trivial reject" means
A)   That the intersection is trivial to compute.
B)   That the boundaries on the visible side of the line are incomplete.
C)   That the process of rejection is always trivial.
D)   That the line is not visible when its end points are on the invisible side of a clipping boundary.

1.4   The limitation of MIDI are:
A)   It is device dependent
B)   It has only a few channels
C)   It is difficult to configure large MIDI networks
D)   All of the above

1.5   Hypermedia
A)   is another media like graphics, text etc.
B)   provides link between two media
C)   is a facility to permit two media to be played together
D)   is another name of multimedia

1.6 The transformation wherein the object is first rotated about x-axis and then about y-axis is
A) instant
B) rotation
C) shearing
D) tilting

1.7 The perspective transformation between object and image can be
A) a linear 3 x 3 transformation
B) a linear 4 x 4 transformation
C) a nonlinear 3 x 3 transformation
D) a nonlinear 4 x 4 transformation

1.8 A touch screen is recommended for
A) pressure-sensitive drawing and painting
B) projects that track users
C) program involving public input and simple tasks
D) day-to-day computer work

1.9 The second derivative of the Bezier curve at the initial and final points depend on
A) the nearest two polygon vertices
B) the nearest three polygon vertices
C) the nearest four polygon vertices
D) none of the above

1.10 The process of creating computer animation by specifying a number of model poses and allowing the computer to interpolate these poses to produce smooth movement is called
A) stop motion animation
B) key framing
C) rotoscoping
D) rendering

2. Each statement below is either TRUE or FALSE. Choose the most appropriate one and ENTER in the "tear-off" sheet attached to the question paper, following instructions therein. (1 x 10)

2.1   The viewing transformations for orthographic projection include a shear matrix.

2.2   The data point in a bitmap field map is the pixel to the image.

2.3   The two point perspective transformation does not provide an adequate perception of the three-dimensional shape of the object.

2.4   For a B-spline curve of degree 3, a point on the curve lies within the convex hull of two neighboring points

2.5   The Mid Point subdivision algorithm is applicable even if the clipping window is not a regular rectangular polygon.

2.6   If refreshing rate remains constant then phosphor material with high persistence causes flickering.

2.7   If we change the viewport, we see the same part of the object drawn at different places on the display.

2.8   The vector objects are easily scalable without loss of resolution or image quality.

2.9   JPEG files can be saved numerous times with no loss in image quality.

2.10   Objects do not appear to be distorted when viewed through oblique projection.

3. Match words and phrases in column X with the closest related meaning/ word(s)/phrase(s) in column Y. Enter your selection in the "tear-off" answer sheet attached to the question paper, following instructions therein. (1 x 10)

	X		Y
3.1	Technique used to create the illusion of one object changing shape to another	**A.**	Spline curve
3.2	System used for representing colours on computer	**B.**	Parametric curve
3.3	Abbreviation for dots per inch, which indicates the resolution of images	**C.**	RGB
3.4	Continuous curve that starts with one control point and end with another end at other control point	**D.**	Morphing
3.5	An artificial environment created with computer hardware and software	**E.**	GIF
3.6	Technique to remove jagged lines	**F.**	Antialising
3.7	Is the process of removing lines or portions of lines outside of an area of interest	**G.**	CMY
3.8	Changing the frames with respect to time	**H.**	Tweening
3.9	A special spline curve	**I.**	Virtual Reality
3.10	A commonly used standard method of compressing photographic images	**J.**	DPI
		K.	Animation
		L.	Line Clipping
		M.	B-Spline
		N.	JPEG

4. **Each statement below has a blank space to fit one of the word(s) or phrase(s) in the list below. Enter your choice in the "tear-off" answer sheet attached to the question paper, following instructions therein.** (1 x 10)

| A.	Parallel	B.	Perspective	C.	Stroke method
D.	Translation	E.	Boundary fill	F.	Morphing
G.	Rotation	H.	Dataglove	I.	More
J.	MPEG	K.	Scaling	L.	Image processing
M.	Scan-line method	N.	Flood fill	O.	JPEG
P.	Scan Conversion	Q.	Less	R.	Raster Scan

4.1 _____ creates characters out of a series of line segments.

4.2 In _____ projection image points are found as the intersection of view plane with a projector drawn from the object and having fixed directions.

4.3 _____ is a device to interact with animated artificial objects.

4.4 _____ is the process of converting the rasterized picture stored in a frame buffer to the rigid display pattern of video.

4.5 Dragging in computer graphics can be achieved through _____.

4.6 MIDI files occupy _____ space than .WAV files.

4.7 The _____ algorithm is useful when the region is to be filled has no uniformly colored boundary.

4.8 _____ is used to photo realistic images containing many colours.

4.9 A technique for creating a smooth transition between two images is called _____.

4.10 Zooming operation on the screen can be carried using the _____ transformations.

PART TWO
(Answer any **FOUR** questions)

5.

a) Describe the Bresenham's algorithm to draw a circle whose centre is origin and radius is 7.

b) Explain briefly the following file formats:
i)   JPEG
ii)   MPEG

(7+8)

6.

a) What is the need of backface removal technique? How does Floating Horizon algorithm determine which surface is hidden?

b)
i)   If one Bezier curve $P(t)$ of degree n is defined by vertices B_i and an adjacent Bezier curve $Q(s)$ of degree m by vertices C_i, state the first and second – derivative continuity conditions at the joint between the curves.

ii)   For a Bezier curve, $P(u)$, of degree 5, suppose the control points are $B_1(0, 0)$, $B_2(2, 2)$, …, $B_5(5, -1)$ and $B_6(7, 0)$. Find the remaining control points of the curve which has its second derivative at u=0 and u=1 equal to zero.

(9+6)

7.

a) Consider the following figure and find transformation matrix to reflect the triangle ABC with respect to the line PQ. {A=(1, 1), B=(4, 1), C=(3, 3) and the line PQ intercept y-axis at (0, 2)}.
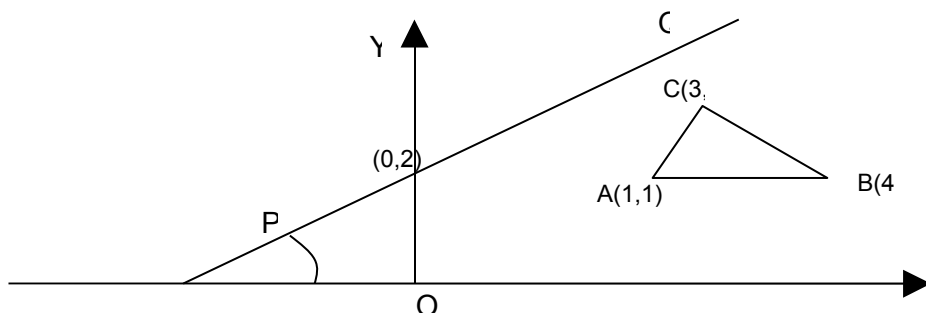
b) Why is Mid-point sub-division algorithm preferred over Cohen-Sutherland algorithm for the clipping? Write Mid-point sub-division algorithm for line clipping.

(7+8)

8.

a) Consider a window having vertices A(1, 1), B(5, 3), C(4, 5) and D(0, 2). Find the normalization matrix N that maps this window onto normalized device co-ordinate system (NDCS) whose co-ordinates are (0, 0) and (1, 1), respectively.

b) What is Hypermedia?

c) What are the advantages and disadvantages of MIDI over digital audio?

(6+4+5)

9.

a) Explain the mechanism and working principle of a mouse.

b) Describe the shadow mask technique for the origin of colors in a CRT. What are its limitations?

c) How does a Rubber band technique help in graphics?

(6+6+3)